



SRP AND THE EVOLVING ENERGY WORLD

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SENIOR SUSTAINABILITY STRATEGIST



Salt River Project - 2017

- Not for profit established in 1903
- 114 year steward of the environment
- Largest water supplier to Valley
- Third largest public power utility in the Nation
- 1,000,000 + electric customers



How did we get to where we are today?

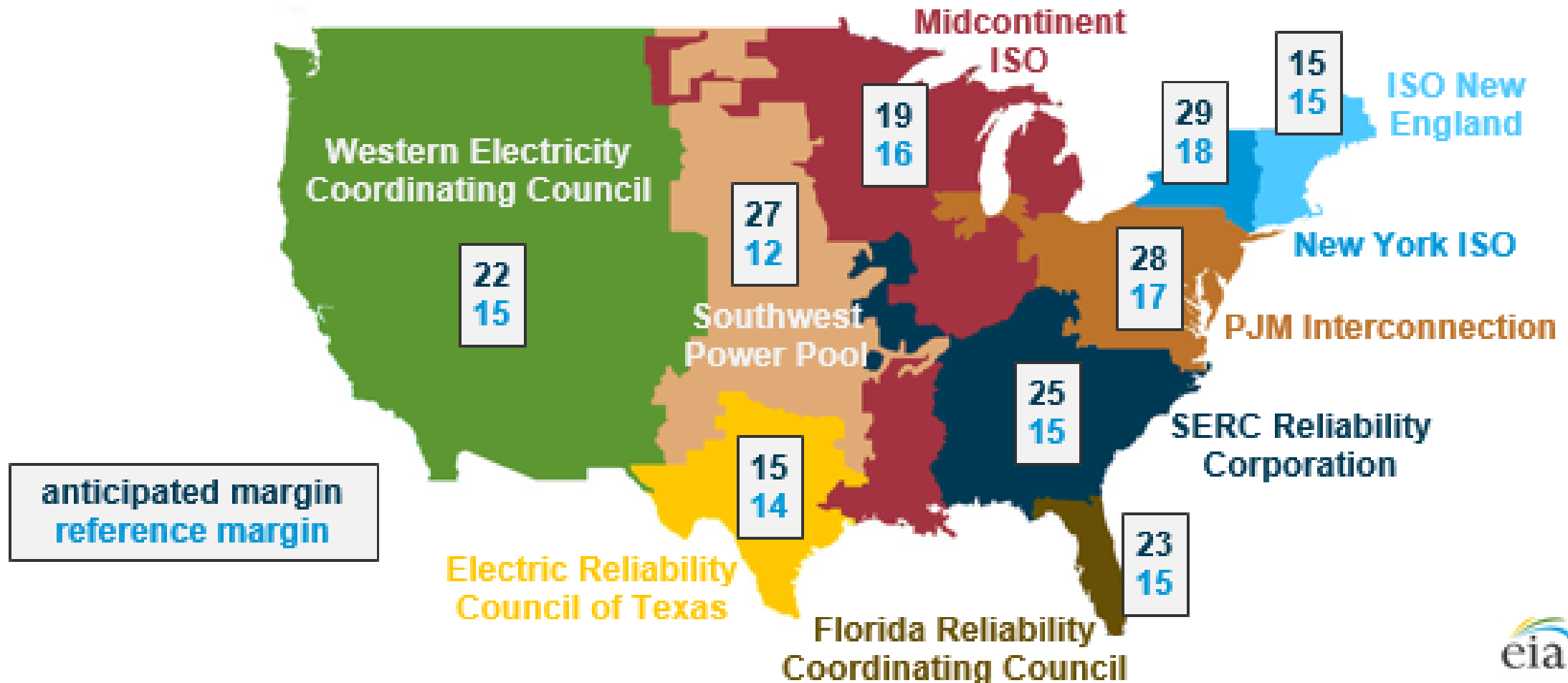
Obligation to Serve

NY City
1887



North American Electric Reliability Corporation Requirements

Reference margins and anticipated reserve margins in select NERC regions, summer 2017



Another Industry



You build your hotel with 100 rooms, that is the most you think you will sell given the market you serve. But you are required by law to have 15% extra on call in case someone else comes by because you are not allowed to turn anyone away.

What is the cost of those last 15 rooms? Who pays it?



Utility Balancing Act

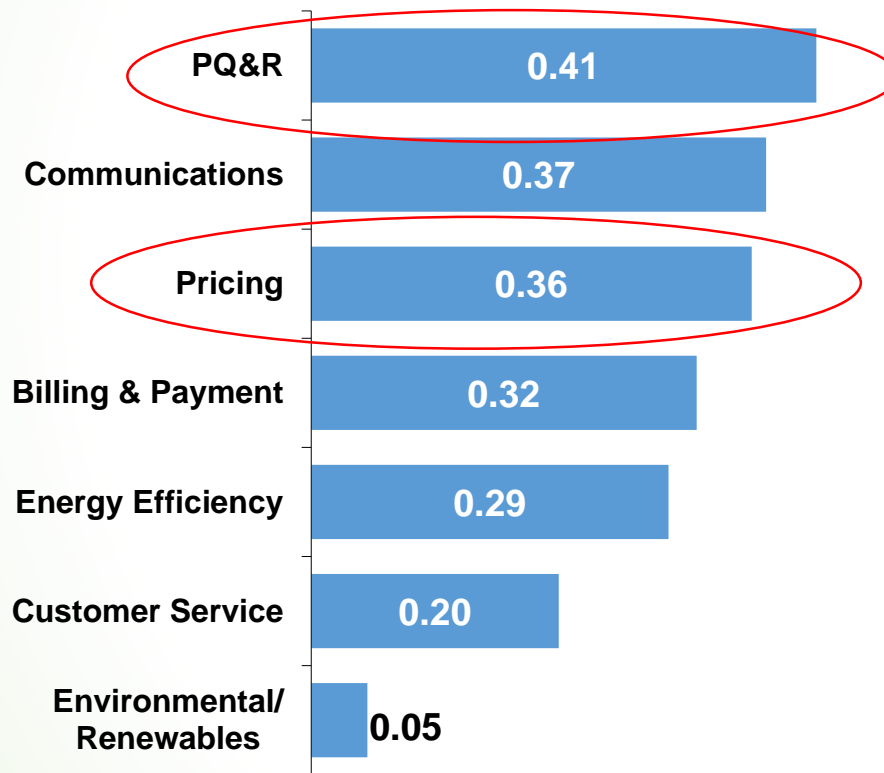
- Demand/Generation
- Voltage maintenance
- Frequency regulation



Customer Perspectives: Drivers of Overall Satisfaction

Key Drivers of Satisfaction

FY17



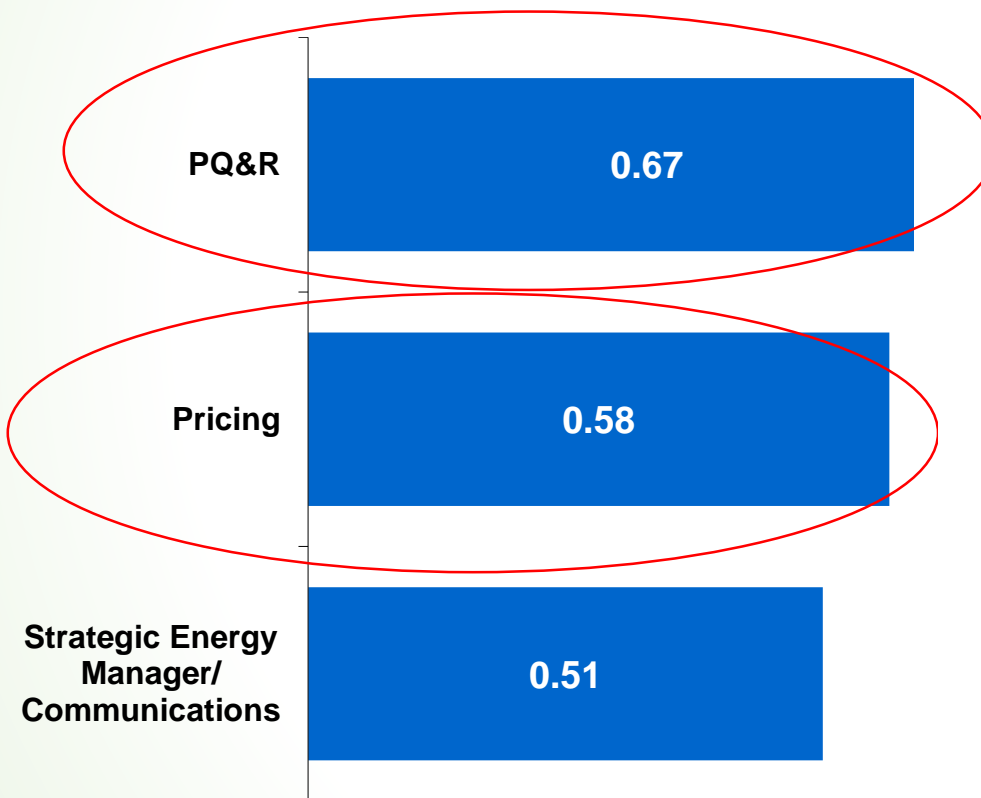
While the key drivers of overall satisfaction with SRP's ability to meet electric needs continues to center on **PQ&R**, other drivers emerge in importance:

- **Communications** is the leading driver of customer experience, SRP performance, and brand image.
- **Customer service** is the leading driver of ease of doing business.

Customer Perspectives: Drivers of Overall Satisfaction

Key Drivers of Satisfaction

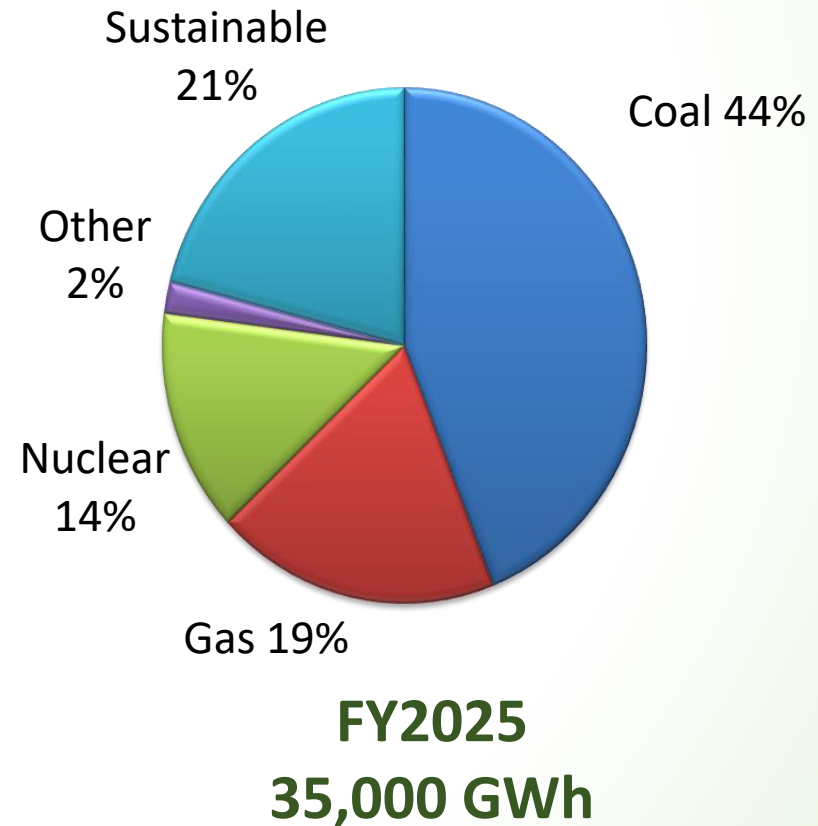
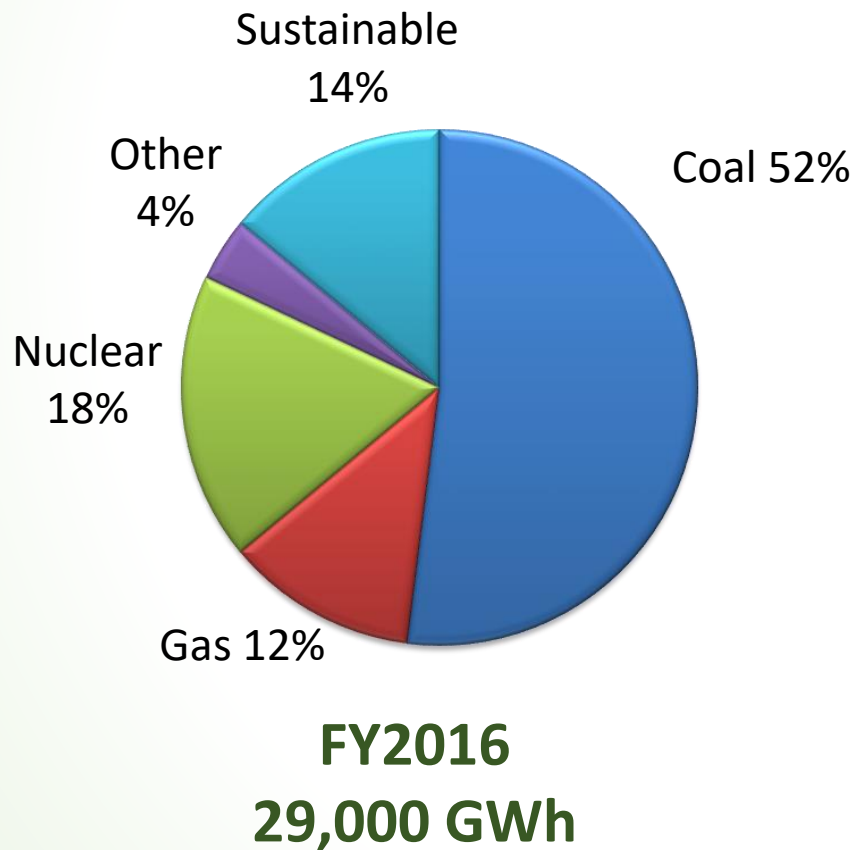
Large/Strategic Customers FY17



Among Large/Strategic Business customers, **PQ&R** remains the leading driver of satisfaction with SRP's ability to meet electric needs, as well as SRP performance and customer experience.

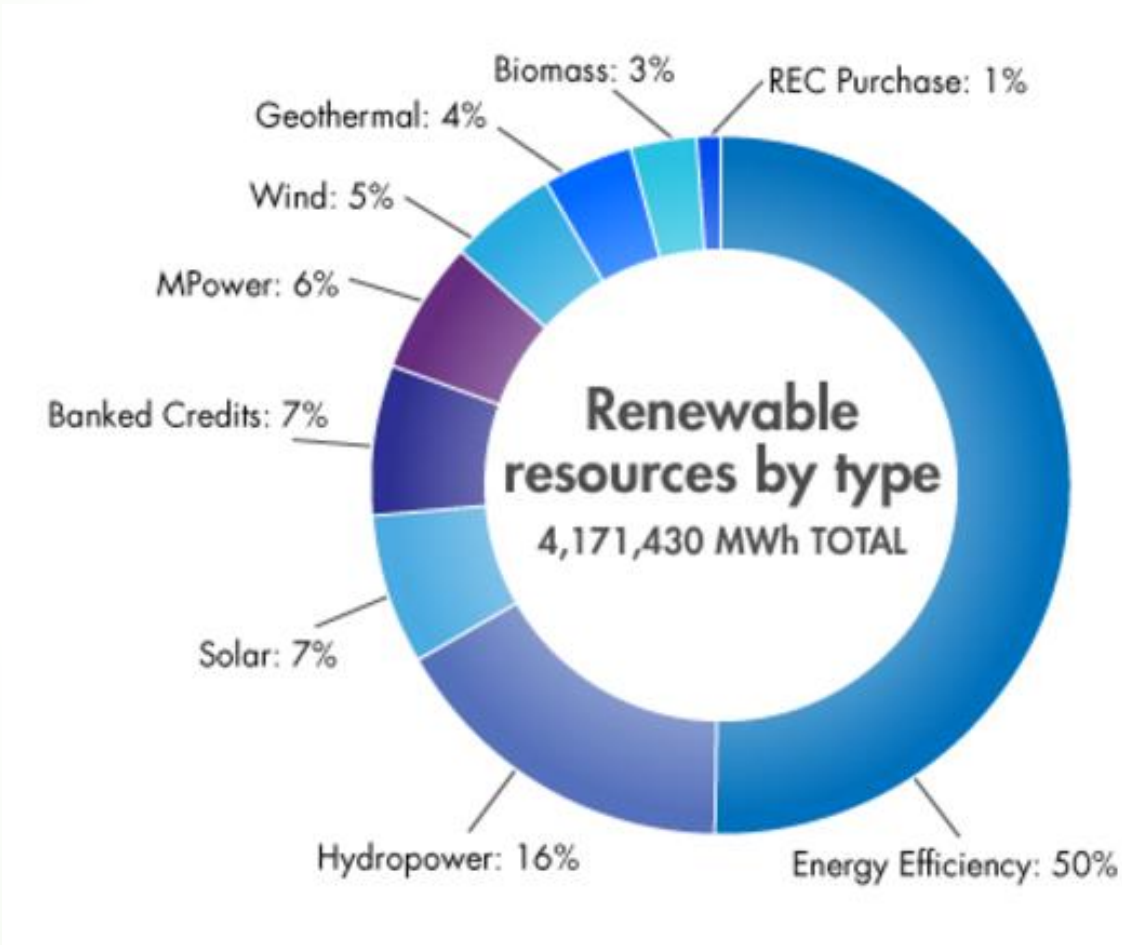
- **Strategic Energy Manager/Communications** is the leading driver of brand image and ease of doing business.
- **Pricing** is the leading driver of value.

Energy Mix Today and the Future



Sustainable Portfolio

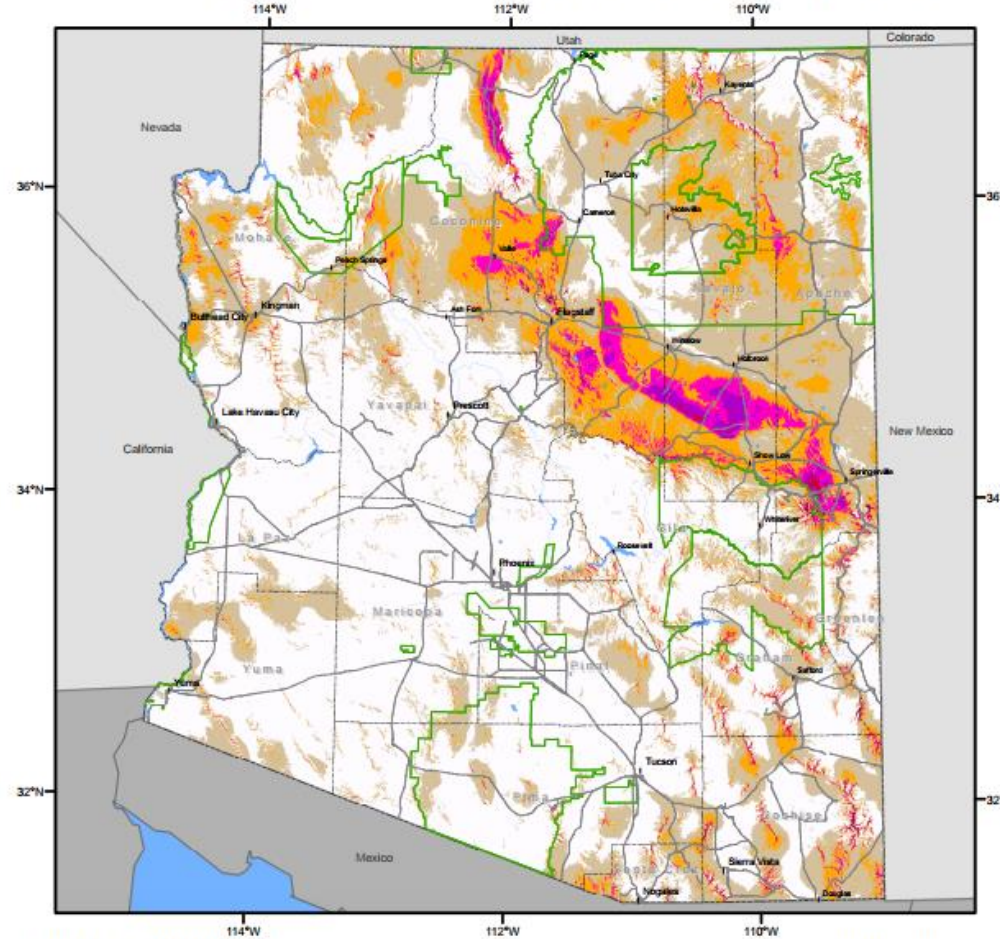
Fiscal Year 2016



Total: 14.5% of Retail Sales

State of Arizona

Average Annual Wind Resource 328 ft (100m)



Created by: Grant Brummels
 Date of Creation: 7/6/2005
 For more information contact:
 Dr. Earl Duque
 Earl.Duque@nau.edu

Projection:
 UTM, Zone 12, WGS84
 Spatial Resolution of
 Wind Resource Data: 200m

**Sustainable
 Energy Solutions**
 www.ses.nau.edu



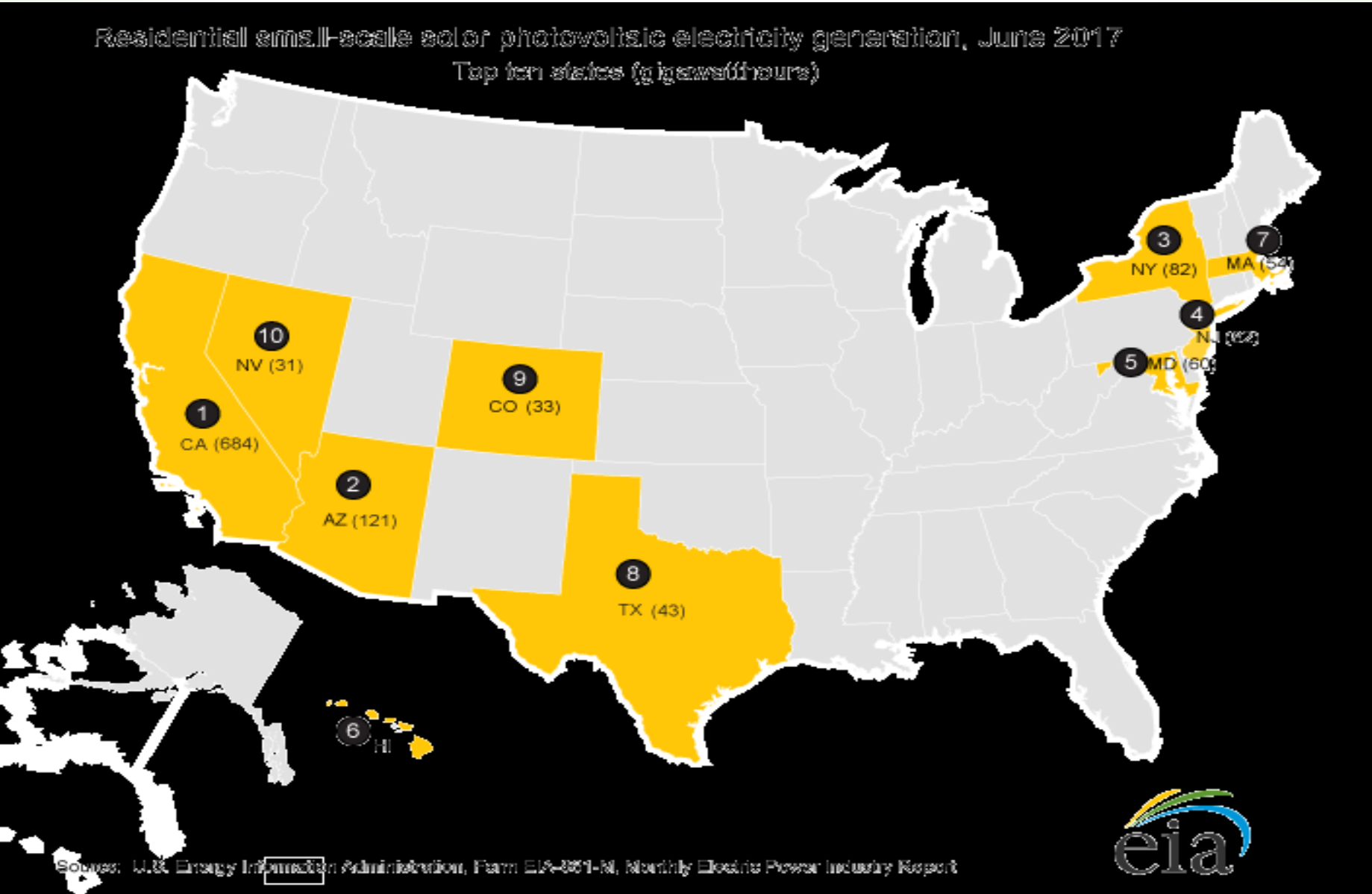
Wind Power Classification		
Wind Power Class	Wind Power Density (W/m ²)	Wind Speed (mph)
1 Poor	0 - 200	0.0 - 12.3
2 Marginal	200 - 300	12.3 - 14.1
3 Fair	300 - 400	14.1 - 15.7
4 Good	400 - 500	15.7 - 16.8
5 Excellent	500 - 600	16.8 - 17.9
6 Outstanding	600 - 800	17.9 - 19.7
7 Superb	> 800	> 19.7

- Legend**
- County Boundary
 - Indian Reservation
 - Rivers and Water Bodies
 - Major Roads

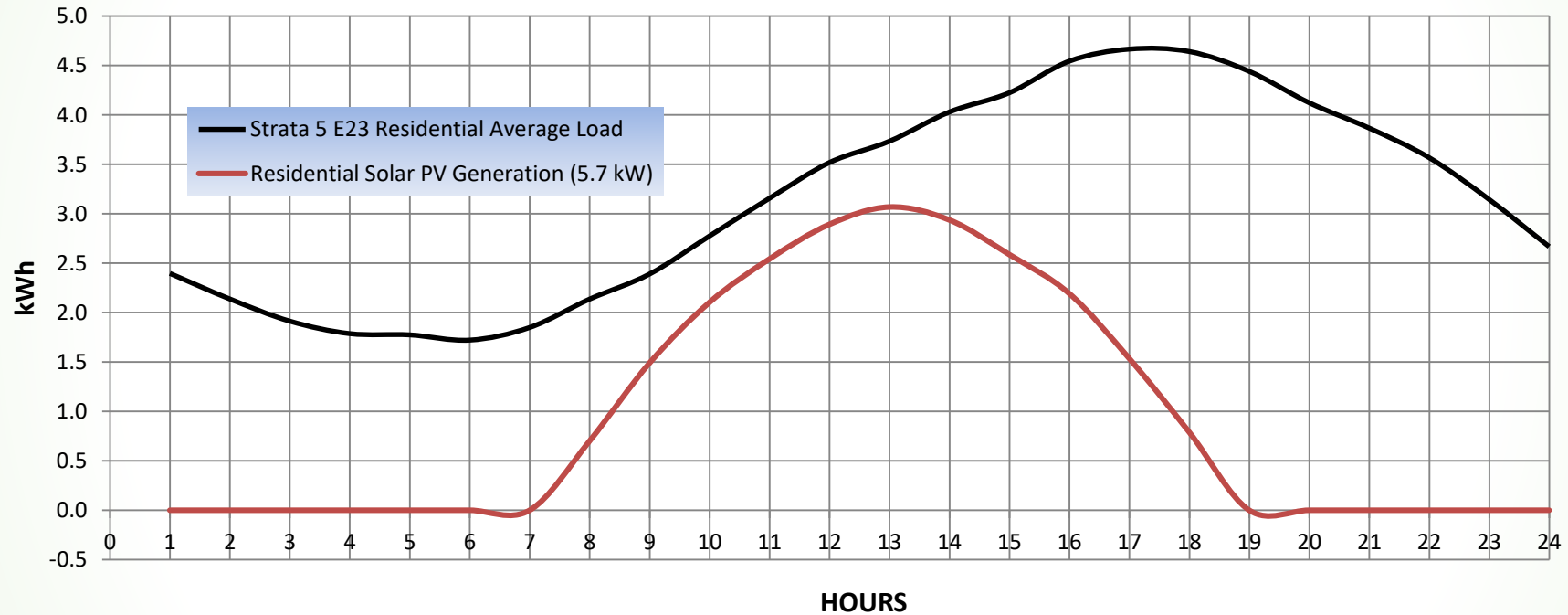
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Top Solar Generation States

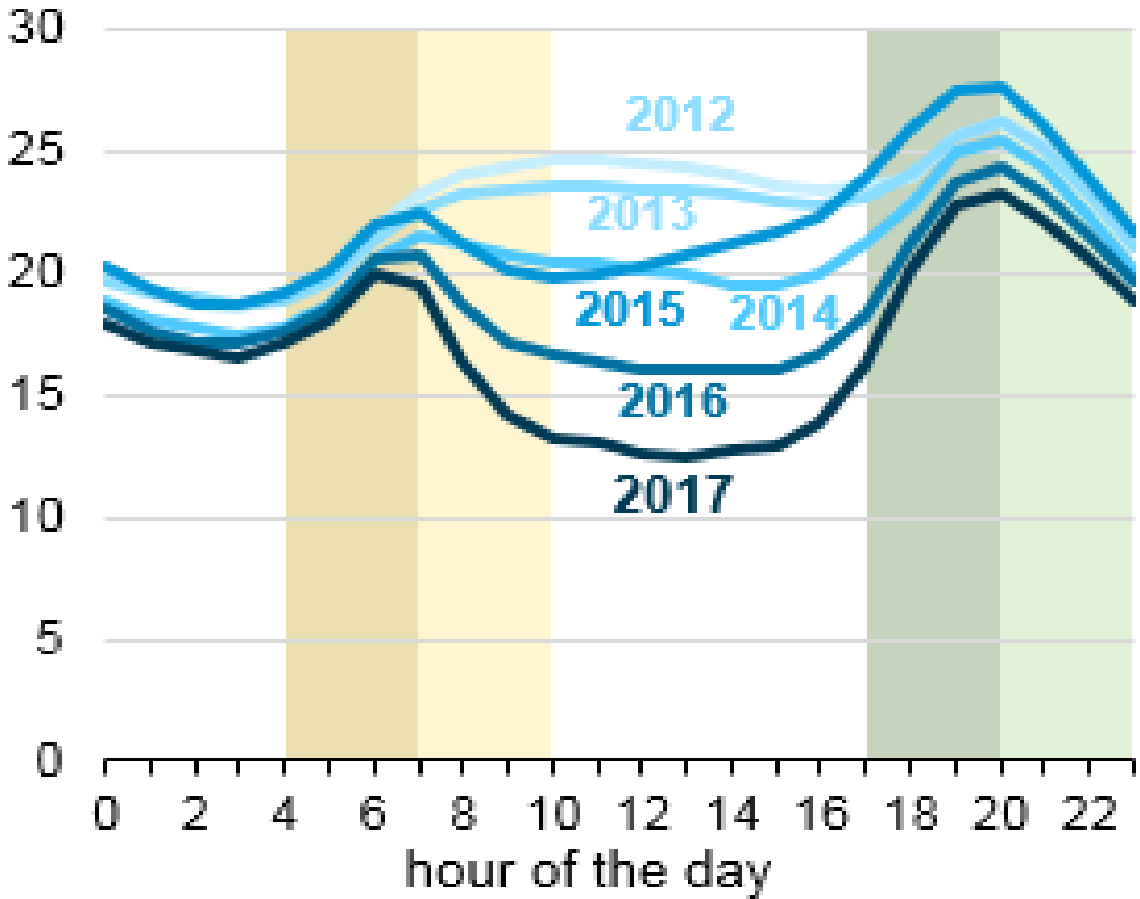


Solar Generation vs. Typical Customer Load (Summer)

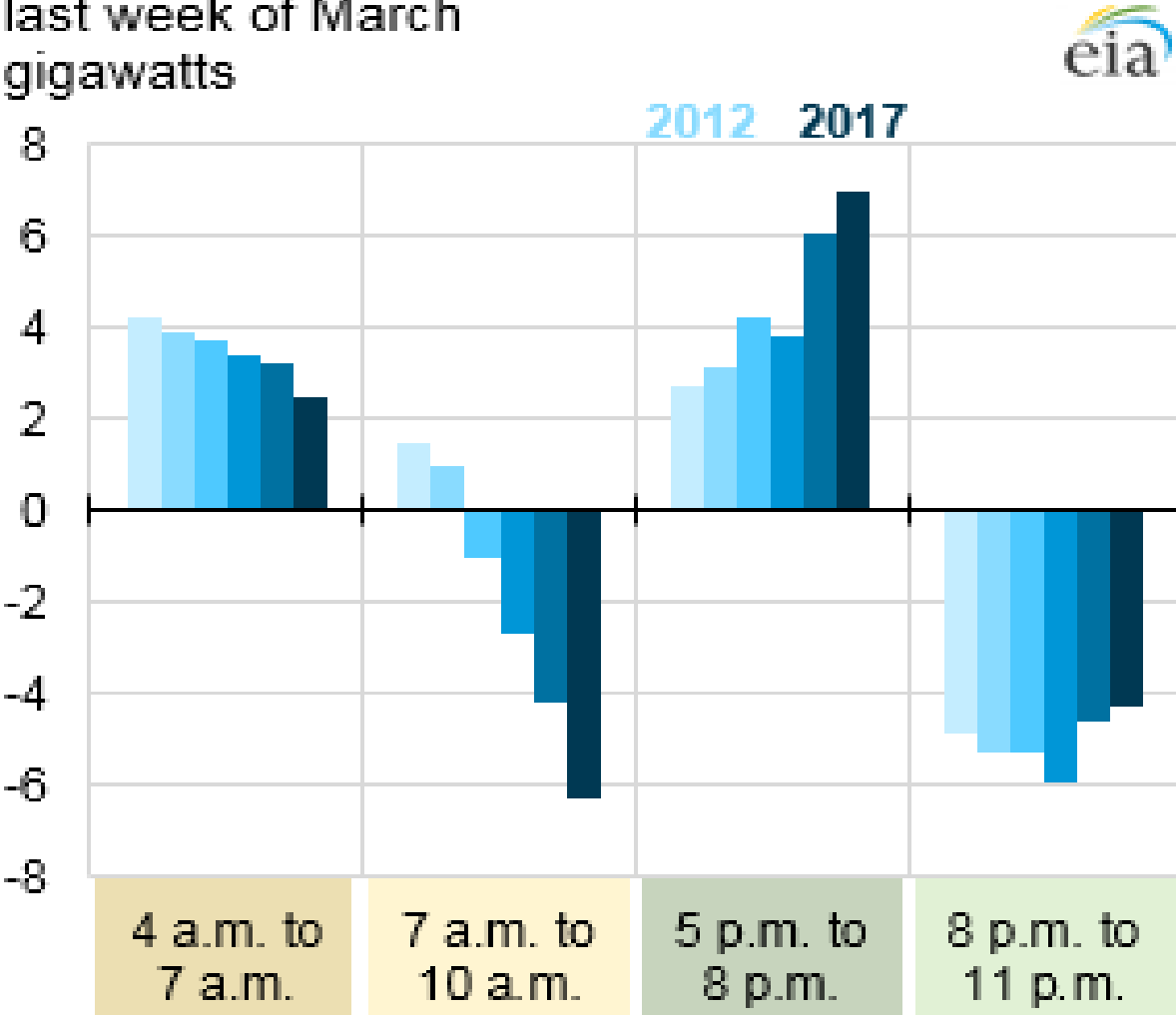


Solar Impact on Electric Load in CA

California ISO average net electric load last week of March
gigawatts



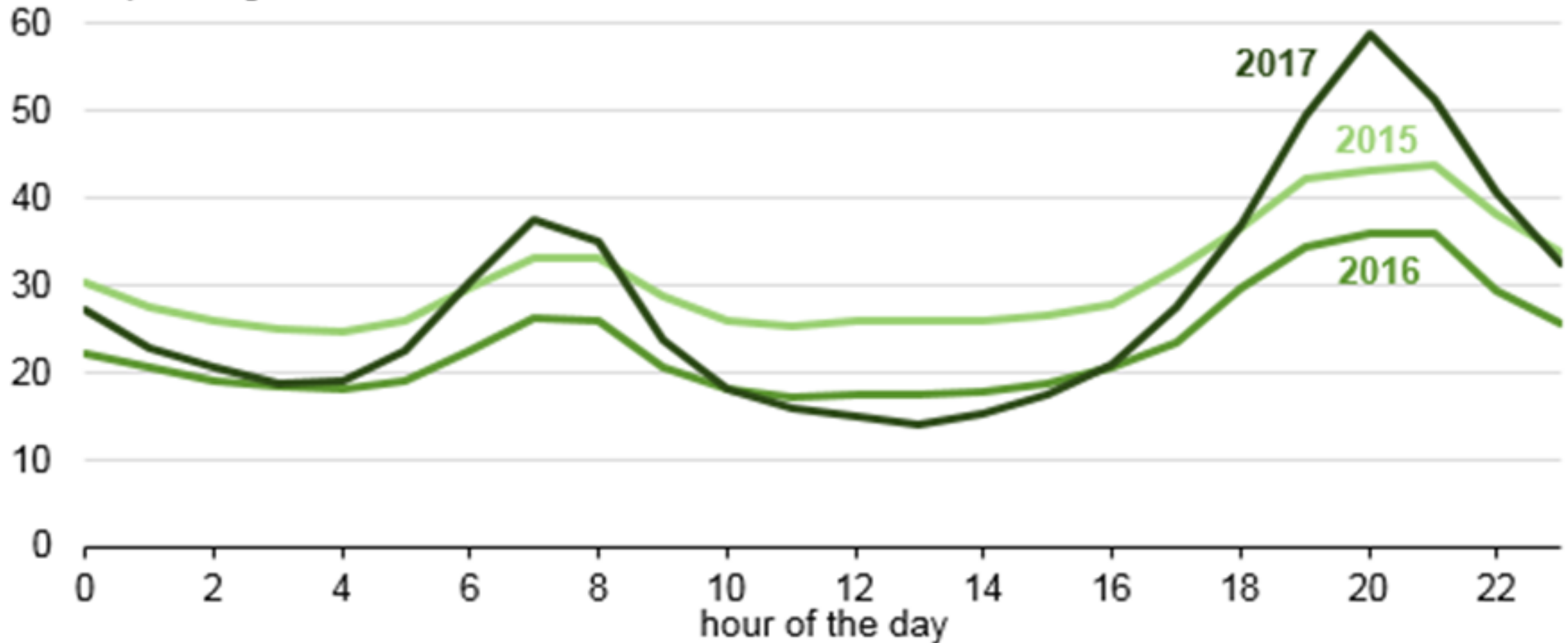
Net load change during ramping periods last week of March
gigawatts



Electric Prices in CA

California Independent System Operator average hourly day-ahead energy market prices

January through June average
dollars per megawatt-hour



Negative Electric Pricing in CA

Percent of Negatively Priced Hours for ELAP_AZPS

		Hour																							
Year	Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
2016	10				3%	3%				3%	13%	16%	19%	13%	10%	10%	6%								
	11			3%			3%	3%	7%	13%	20%	20%	20%	33%	20%	10%	3%								3%
	12					6%	6%				3%	10%	29%	26%	26%	10%	3%								
2017	1	3%	6%	6%	10%	10%	10%			6%	19%	13%	16%	26%	23%	13%	13%	6%							
	2		7%	7%	18%	25%	11%	4%		18%	39%	36%	43%	29%	29%	29%	29%	25%							4%
	3		3%	6%	13%	39%	13%	3%	10%	23%	45%	52%	55%	52%	65%	42%	48%	32%	10%				3%		6%
	4	7%		10%	10%	17%	13%	7%	13%	30%	23%	30%	50%	37%	33%	37%	33%	27%	13%	3%		3%			3%
	5	3%	3%	3%	3%			6%	23%	26%	16%	19%	16%	19%	19%	19%	10%								
	6				7%			17%	23%	30%	27%	17%	13%	13%	10%	10%	7%								3%
	7	3%	3%	3%			3%	3%	3%	6%	3%														

Source: California ISO load settlement reports

What do these mean for longer term market changes?

INTERNAL INITIATIVES & PROGRAMS

Historical Game Changers for SRP

- 1948 Industry upgrade from 25 to 60 Hz
- 1950s Rapid expansion of air conditioning in Valley
- 2000s Electric Vehicle and onsite solar adoption
- 2010s Distributed energy, battery storage and other technology advancements

Resource Planning

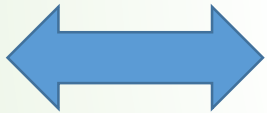
SRP resource plans are 20 year electric use and resource forecasts.

- Significant uncertainty exists with important planning drivers, which include big picture inputs such as regional economic growth projections and natural gas prices as well as more discrete drivers like the capital costs associated with building a new power plant.
- To structure and analyze, SRP utilizes scenario planning—a tool used by other leading organizations. Scenario planning allows us to consider the outcomes of different resource decisions under a variety of possible futures. The results of this process assist in determining the best strategic path forward for preserving the value our customers receive.

System Upgrades



- Our system was built as a one way delivery system with over 1400 circuits and a looping design which allows for detours in case of an outage.



- Now we are in the process of making sure every circuit can handle two way traffic. But each circuit is different, which makes this exacting work to complete.

SRP Battery Pilots

Battery Energy Storage Systems (BESS) have many capabilities, many of which can function simultaneously. SRP is planning to test many of these along with how best to integrate with SRP's Operations Centers. Below are some of the BESS functions that SRP is planning to evaluate.

- Peak Shaving
- Solar Energy Shifting
- Frequency Regulation
- Voltage control / Reactive Power Support
- Spinning Reserve

SRP Battery Pilots

One project 10MW / 40MWh storage only for peak shaving



One project 20MW solar and 10MW / 40MWh storage for energy shifting



Copper Crossing Solar Ranch



20 MW Solar Plant

Sandstone Solar



45 MW Solar Plant

Communications and Reporting



CUSTOMER PROGRAMS

SRP Advanced Inverter Pilot Study

- Objective – Position SRP Grid to accommodate SRP customer sited generation
 - Purpose – Determine Advanced Inverter settings, communications, and control requirements
 - Value – Continue legacy of SRP’s high value service, integrating solar while minimizing overall costs
- Project Benefits
 - Better understand advanced inverter capabilities for future integration of DER with a modern grid infrastructure
 - Understand how to maintain system reliability and customer expectations

Electric Vehicles

EV growth

- United States 652,738
- Arizona EV Registrations 9,630
- SRP EV Registration 4,488
- EV Community 1,488
- SRP Employee EVs 94

Auto manufacturers investing billions in new models and technology

- Over 60 models available
- Increased commitment by manufacturers, some going 100% electric in future model years.



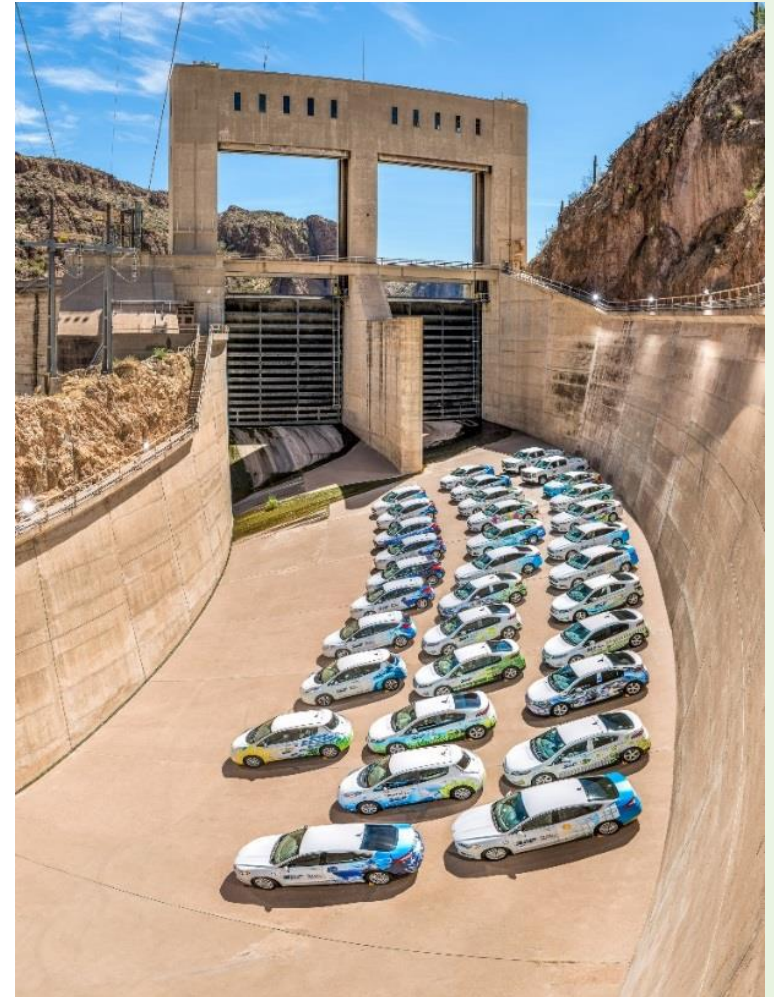
Electric Vehicles

- SRP partnered with Nissan to offer a \$10,000 price reduction on the Leaf, to SRP customers and SRP employees.
- SRP EV programs
 - \$50 Amazon gift card to join EV community
 - \$500 rebate for business customers
 - chargers
 - EV TOU price plan E-29 Super off peak
 - 43 Fleet EVs
 - 140 charging stations



Charger Rebate for Business Customers

- Position your company as an innovative brand
 - Meet sustainability goals or clean air reporting targets
 - Recruit and retain employees with attractive benefits
 - Reduce employee commute time (carpool lane access)
- Enhance bottom line with reduced fleet operating and maintenance costs





EARTHWISE ENERGY:
Now open for business

Regular:

Residential or Business Customers can match 50% or 100% of electricity usage

- Additional 1-cent more per kilowatt-hour (Example: Use 1,000 kWh in a month and pay \$10 extra)
- Renewable resources (1/3 solar, 1/3 wind and 1/3 geothermal and biomass)
- Allows customers to claim/market their commitment to renewable energy

Custom:

- Customer may specify any qualities within the REC market
- Market price plus 10% administration fee

Online Calculator

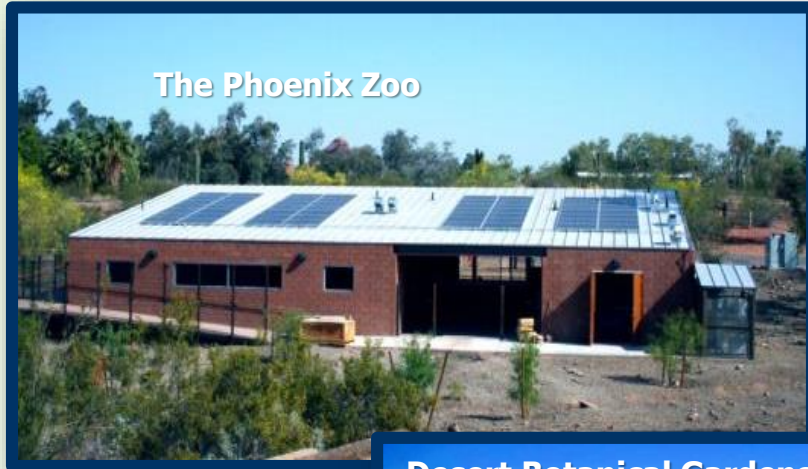
Is EarthWise Energy™ Right for Me?

Take the first step and reduce your carbon footprint. With SRP EarthWise Energy, you can purchase a mix of regional, renewable resources like solar power and wind. Use this tool to estimate the cost to purchase renewable energy and your environmental impacts.



Start My Estimate

Solar donated to charitable organizations



- Allows customers to fund solar energy projects on nonprofits in the community
 - \$3 per month
 - 3,750 customers
- Additional projects
 - Sunshine Acres Children's Home
 - Boys & Girls Club of the East Valley
 - Habitat for Humanity (18 homes)

Rooftop/Parking Structure Solar

- Install a PV system at your site
- Offset your load with energy produced
- Receive a bill credit for the wholesale value of the excess energy generated
- SRP can assist in understanding how to maximize the benefits of your system



Commercial Customer Systems



Gatorade
– 1,700 kW system



IKEA
– Two 300 kW systems

More than 500 commercial customers have installed solar

Dedicated Solar Plant

- Larger projects you cannot host onsite
- Lease land from SRP to site your owned project
- SRP takes care of RFP
- Bill credit issued for generation per contract

Things to Consider

- First things first
- What are your drivers?
- Market conditions
- What is your timeline?
- How can you stack value of DER?

We are listening

- Renewable Energy Buyers Principles
 - Attended REBA conference
- Customer meetings
 - Individual and Advanced Energy Economy

And what we are hearing....

- Unprecedented flexibility
- Variance in priorities
- Longer term view

What would you like to add?

Thank you!

